

## **TECHNIQUES FOR COUPLING IN SEMICONDUCTOR DEVICES**

### **Abstract of the Disclosure**

Techniques for exchange coupling of magnetic layers in semiconductor devices are provided. In one aspect, a semiconductor device is provided. The device comprises

5 at least two magnetic layers, and a spacer layer formed between the magnetic layers, the spacer layer being configured to provide ferromagnetic exchange coupling between the layers, the magnetic layers experiencing anti-ferromagnetic dipole coupling, such that a net coupling of the magnetic layers is anti-ferromagnetic in a zero applied magnetic field. The semiconductor device may comprise magnetic random access memory (MRAM). In

10 another aspect, a method for coupling magnetic layers in a semiconductor device comprising at least two magnetic layers and a spacer layer therebetween, the method comprises the following step. Ferromagnetic exchange coupling is provided of the magnetic layers, the magnetic layers experiencing anti-ferromagnetic dipole coupling, such that a net coupling of the magnetic layers is anti-ferromagnetic in a zero applied

15 magnetic field.